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**Appendix D**  
**AIR QUALITY IMPACT AND**  
**CONFORMITY ANALYSIS**

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**NACO AND DOUGLAS STATIONS LEVEL INFRASTRUCTURE PROJECTS  
ENVIRONMENTAL ASSESSMENT  
AIR QUALITY IMPACT AND CONFORMITY ANALYSIS**

**1.0 Overview as Related to Air Emissions**

The United States Border Patrol (USBP) proposes two projects to construct four roads within the 300 foot corridor of the enforcement zone in Cochise County, Arizona. A detailed description of the projects is included in the preceding sections of this document. Part of Cochise County is classified as a Nonattainment Area for sulfur dioxide (SO<sub>2</sub>) and as a moderate Nonattainment Area for particulate matter with an aerodynamic diameter less than 10 microns (PM<sub>10</sub>). Emissions of these two pollutants from the projects are addressed in this section as they relate to the General Conformity Rule under the Clean Air Act (CAA).

Construction activities will be conducted on ten day rotations for approximately seventy-five days annually. The construction will take place on two separate projects: the Naco Station Level Infrastructure Project and the Douglas Station Level Infrastructure Project. The Naco project will be approximately thirty-one miles and the Douglas project approximately twenty-six miles. Sources of air emissions associated with construction will include SO<sub>2</sub> from combustion engines and PM<sub>10</sub> emissions from vehicle traffic on unpaved roads, bulldozing and compacting, grading, loading excavated material to trucks and dumping, scraping, and blasting. Emissions from unpaved roads will result from construction vehicle traffic, such as, light trucks (pickup trucks), busses, dump trucks, heavy trucks (tractor-trailers), and water trucks. The water trucks will apply water to the road surface to control fugitive dust emissions from vehicle traffic and other construction activities.

Currently, the USBP patrols a degraded unpaved road along the border. Large sections of the border do not have road access at all. USBP agents patrol the area using four wheel drive vehicles, all-terrain vehicles (ATVs), bicycles, and horses. Drag roads are used as an essential tool in detecting illegal border crossings. During dragging operations, road surfaces are smoothed to show fresh signs of illegal alien crossings. After construction, agents will patrol and drag the area in much the same manner.

**2.0 Air Emissions Estimations**

Increases in air emissions due to the two proposed projects have been evaluated to determine the applicability of the General Conformity Rule (discussed in Section 3.0 below). Increased air emissions are expected during road construction. Air emissions due to routine patrol activities are expected to be the same before and after the construction of the new roads; therefore, the air emissions evaluation is focused only on emissions from road construction activities.

Generally, emission factors from the Environmental Protection Agency's (EPA) Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources were used to estimate emissions. Additional sources were EPA's Air/Superfund National Technical Guidance Study Series: *Estimation of Air Impacts from Area Sources of Particulate Matter Emissions at Superfund Sites* (EPA-451/R-93-004), the National Climatic Data Center's (NCDC) *Climatic Wind Data for the*

*United States*, and Revised Universal Soil Loss Equation (RUSLE) Related Attributes. Supporting emission calculations are provided as part of this analysis.

Sulfur dioxide emissions were calculated based on AP-42 Section 3.3 Table 3.3-1. SO<sub>2</sub> emission factors in pounds per million British thermal units (lb/MM Btu) for from gasoline and diesel fuel were converted to weight per volume (lb/1,000 gallons) of fuel used. Fuel usage was derived from the average mileage of each vehicle and the estimated hourly and annual miles traveled.

A summary of the resulting SO<sub>2</sub> emissions estimates is provided in Table 2-1 below. Detailed assumptions and calculations are presented in Appendix A.

Table 2-1  
SO<sub>2</sub> Emissions Summary

Construction Activity	Naco Station Project (tons/yr)	Douglas Station Project (tons/yr)
Light Truck	0.001	0.001
Bus	0.001	0.001
Dump Truck	0.05	0.05
Heavy Truck (Tractor-Trailer)	Negligible	Negligible
Water Truck	0.07	0.07
Bulldozers/Graders	0.45	0.45
Scrapers	0.001	0.001
Total Emissions	0.57	0.57

Particulate emissions from unpaved roads was calculated using AP-42 Section 13.2.2 Equation (2). The equation calculates an emission factor in pounds per vehicle mile traveled using the surface material moisture content, the mean vehicle weight, and the surface material silt content. The moisture content was obtained from the AP-42 Section 13.2.2 Related Information document. Water sprays will be used every half hour to saturate loose soil at the construction site. Based on AP-42, it is estimated that thoroughly watered soil will hold approximately 20% moisture. Based on the silt content obtained from Cochise County RUSLE Related Attributes it was determined that the silt content range maximum provided for Equation (2) should be used. Equation (2) requires the mean vehicle weight rather than individual vehicles types. Also, the equation was developed for use at vehicle speeds greater than fifteen miles per hour. Construction equipment generally travels at lower speeds; therefore, the weighted average speed was determined and used to develop a correction coefficient (S/15) for speeds less than fifteen miles per hour. Vehicle miles traveled was determined from the greatest distance between access roads and the number of round trips required to support construction operations.

Particulate emissions from bulldozing and compacting was determined using AP-42 Sections 13.2.3 and 11.9. It was assumed that three bulldozers will operate at each project site and operations will occur during 100% of operating hours (600 hours per year). Particulate emissions from grading operations were also determined using AP-42 Sections 13.2.3 and 11.9. An emission factor (pounds per vehicle mile traveled) was developed using the mean vehicle speed, which was conservatively assumed to be five miles per hour. Vehicle miles traveled was determined from the width of the bulldozer and the area of grading per year.

Particulate emissions from loading excavated material to trucks and truck dumping was determined using AP-42 Section 13.2.4 Equation (1). The mean wind speed (Tucson, AZ) was obtained from the NCDC. A recommended material moisture content of 2% (EPA-451/R-93-004, page 13) was used rather than 20% from previous equations. This conservative decrease in moisture was assumed due to evaporation and the impracticality of water application to excavated material.

Particulate emissions from scraping operations was determined using AP-42 Section 13.2.3 where an empirical emission factor in pounds per vehicle mile traveled was given. Blasting emissions were determined from AP-42 Section 11.9. It was conservatively assumed that operations would require 600 blasts per year and each blast would be over a 31 square meter area.

A summary of the resulting PM<sub>10</sub> emissions estimates is provided in Table 2-2 below. Detailed assumptions and calculations are presented in Appendix A.

Table 2-2  
PM<sub>10</sub> Emissions Summary

Construction Activity	Naco Station Project (tons/yr)	Douglas Station Project (tons/yr)
Vehicle Traffic on Unpaved Roads	13.56	13.54
Bulldozing and Compacting	2.11	2.11
Grading	0.24	0.24
Truck Loading and Dumping	0.04	0.04
Scrapers	0.62	0.62
Blasting	0.001	0.001
Total Emissions	16.57	16.55

### 3.0 General Conformity

The General Conformity rule is set forth in 40 CFR 51 Subpart W—Determining Conformity of General Federal Action to State or Federal Implementation Plans. According to the Code of Federal Regulations (CFR) 40 CFR 51.853(b), Federal actions require a conformity determination for each pollutant where the total of direct and indirect emissions in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs 40 CFR 51.853(b)(1) or (2).

Douglas was first designated as a [SO<sub>2</sub>] nonattainment area in 1978. The primary source in Douglas was the Phelps Dodge, Inc. copper smelter, which was dismantled in 1995. In December 2001, ADEQ [Arizona Department of Environmental Quality] submitted to EPA the *Douglas Moderate Area SO<sub>2</sub> Maintenance Plan and Request for Redesignation to Attainment*.

The Douglas PM<sub>10</sub> State Implementation Plan (SIP) demonstrates attainment "but for emissions emanating outside the United States" (Section 179B of the Clean Air Act). Ambient monitoring data reveal that the Douglas area has met the 24-hour and annual PM<sub>10</sub> standards for the last several years. The last 24-hour exceedance occurred in 1991 and the last annual violation occurred in 1989. (ADEQ, AQD Website, 2002)

Part of Cochise County is a moderate Nonattainment Area for PM<sub>10</sub>. Per 40 CFR 51.853(b)(1), the moderate Nonattainment threshold value for General Conformity

determinations is 100 tons per year of PM<sub>10</sub>. Part of Cochise County is also a Nonattainment Area for SO<sub>2</sub>. Per 40 CFR 51.853(b)(1), the threshold value for all SO<sub>2</sub> Nonattainment Area General Conformity determinations is 100 tons per year of SO<sub>2</sub>. The total emission rates as shown in Table 2-1, Table 2-2, and the attached supporting emission estimation calculations are less than 100 tons per year for both SO<sub>2</sub> and PM<sub>10</sub>; therefore, a conformity determination is not required.

#### **4.0 Conclusion**

The USBP proposes two projects to construct four new roads for Naco and Douglas Stations. The roads will greatly improve the ability of the USBP to patrol the border between the United States and Mexico.

Post-construction operations will be conducted in the same manner as current operations; therefore, post-construction SO<sub>2</sub> and PM<sub>10</sub> emissions will not change from current emissions. Ambient air monitoring data reveal that current operations in the Douglas Nonattainment Area have not contributed to an SO<sub>2</sub> annual violation since 1984 nor a PM<sub>10</sub> annual violation since 1989; therefore, because there will not be an incremental increase in emissions, an analysis of post-construction emissions is not required. An analysis of estimated SO<sub>2</sub> and PM<sub>10</sub> emissions resulting from construction activities shows that the General Conformity threshold for the area will not be exceeded; therefore, a Conformity Determination is not required.

# **APPENDIX A**

## **AIR EMISSION CALCULATIONS**

United States Border Patrol  
Naco Station Level Infrastructure EA

Construction Emissions: Equations and Data

Table 1. Constants, source conditions, and variables

Variable	Description of Variable	Value	Reference
$k_1$	Empirical constant (lb/VMT)	2.6	AP-42 Table 13.2.2-2
$k_2$	Particle size multiplier	0.35	AP-42 13.2.4, Page 3
$s$	Surface material silt content (%)	35.0	AP-42 Table 13.2.2-3
$a$	Empirical constant	0.8	AP-42 Table 13.2.2-2
$W$	Mean vehicle weight (tons)		
$S$	Mean vehicle speed (mph)		
$b$	Empirical constant	0.4	AP-42 Table 13.2.2-2
$U$	Mean wind speed (mph)	8	NCDC 11/98
$A$	Blasting Surface Area (m <sup>2</sup> )		
$M_1$	Surface material moisture content (dry) (%)	20	AP-42 13.2.2 Related Information
$M_2$	Surface material moisture content (%)	2	EPA-451/R-93-004, Page 13
$c$	Empirical constant	0.3	AP-42 Table 13.2.2-2
$E_{ext}$	Size-specific emission factor (lb/VMT)		AP-42 13.2.2 Eq. (2)
$E_{(lb/ton)}$	Emission factor (lb/ton)		AP-42 13.2.4 Eq. (1)

1. Unpaved Roads<sup>1</sup>

$$E_{ext} = \left( \frac{k_1 (s/12)^a (W/3)^b}{(M/0.2)^c} \right) \quad [\text{Equation (2), AP-42 13.2.2}]$$

2. Bulldozing and Compacting<sup>2</sup>

$$E_{lb/hr} = \left[ \frac{1.0s^{1.5}}{M^{1.4}} \right] 0.75 \quad [\text{AP-42 Table 11.9-1}]$$

3. Grading<sup>2</sup>

$$E_{lb/VMT} = 0.51(S)^{2.0} (0.60) \quad [\text{AP-42 Table 11.9-1}]$$

4. Loading Excavated Material to Trucks and Truck Dumping<sup>3</sup>

$$E_{(lb/ton)} = 0.0032k_2 \frac{(U/5)^{1.3}}{(M_2/2)^{1.4}} \quad [\text{Equation (1), AP-42 13.2.4}]$$

5. Scrapers<sup>4</sup>

$$EF = 20.2 \text{ lb/VMT} \quad [\text{AP-42 Table 13.2.3-1}]$$

6. Blasting<sup>2</sup>

$$E_{kg/blast} = (0.52)(0.000014)A^{1.5} \quad [\text{AP-42 Table 11.9-1}]$$

1) Emission factors based on AP-42 Section 13.2.2 (9/98). Vehicle speeds less than 15 mph are corrected with the multiplier S/15. Moisture content is based on the related information document included in Section 13.2.2 Rdmoist.pdf, page 2.

2) Emission factors based on AP-42 Sections 13.2.3 (1/95) and/or 11.9 (7/98)

3) Emission factors based on AP-42 Sections 13.2.3 (1/95) and/or 13.2.4 (1/95)

4) Emission factors based on AP-42 Sections 13.2.3 (1/95)



**United States Border Patrol  
Naco Station Level Infrastructure EA**

**Construcion Emissions: Calculation Assumptions**

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General Assumptions

Rotation =	10 days =	8 hr/day
Working Days per Year =	75 days/yr =	600 hr/yr
Miles Completed per Rotation =	1 mile	
Miles Completed per Year =	7.5 miles	
Project =	31 miles	
Quantity of Soil Moved =	1,746,791 cubic yards (cy)	
Density of Soil =	1890 lb/cy	
Mass of Soil Moved =	1,650,717 tons/project	
Mass of Soil Moved per Year =	399,367 tons/yr	
Water Spray =	2 applications/hr	

Light Trucks

Number of Trucks =	3 trucks
Number of Round Trips per Day =	5 round trips/day
Maximum Trips per Hour =	1.5 round trips/hr
Number of Miles per Trip =	5 miles/round trip
Vehicle Mass =	2 ton
Avg. Fuel Use =	21 mpg

Bus

Number of Busses =	1 bus
Number of Round Trips per Day =	1 round trips/day
Maximum Trips per Hour =	0.5 round trips/hr
Number of Miles per Round Trip =	5 miles/round trip
Vehicle Mass =	5 ton
Avg. Fuel Use =	7 mpg

Dump Trucks

Number of Trucks =	4 dump trucks
Truck Payload Capacity =	20 tons
Number of Round Trips per Year =	19,200 round trips/yr
Maximum Trips per Hour =	8 round trips/hr
Number of Miles per Trip =	0.5 miles/round trip
Vehicle Mass (no load) =	5 tons
Avg. Fuel Use =	4 mpg

Heavy Trucks

Number of Trucks =	2 heavy trucks
Number of Round Trips per Day =	0.1 round trips/day
Maximum Trips per Hour =	1 round trips/hr
Number of Miles per Trip =	5 miles/round trip
Truck Payload Capacity =	20 tons
Vehicle Mass =	5 tons
Avg. Fuel Use =	5 mpg

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**United States Border Patrol  
Naco Station Level Infrastructure EA**

**Construcion Emissions: Calculation Assumptions**

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**Water Trucks**

Number of Trucks =	3 heavy trucks
Number of Round Trips per Day =	48 round trips/day
Maximum Trips per Hour =	6 round trips/hr
Number of Miles per Trip =	5 miles/round trip
Truck Payload Capacity =	15.65 tons
Vehicle Mass =	5 tons
Avg. Fuel Use =	5 mpg

**Bulldozers**

Number of Bulldozers =	3 bulldozers
Hours of Operation =	600 hr/yr
Avg. Fuel Use =	37.5 gal/hr

**Grading**

Number of Bulldozers =	3 bulldozers
Shovel Width =	8 ft
Width of Typical Graded Section =	66 ft
Area per Year =	2,613,600 ft <sup>2</sup> /yr
Vehicle Miles Traveled per Year =	62 miles/yr
Vehicle Speed =	5 mph

**Truck Loading and Dumping**

Number of Trucks =	4 dump trucks
Truck Capacity =	20 tons
Mass of Soil Moved per Year =	96,000 tons/yr
Mass of Soil Moved per Hour =	160 tons/hr

**Scrapers**

Number of Scrapers =	2 scrapers
Cut Width =	8 ft
Width of Typical Scraped Section =	66 ft
Area per Year =	2,613,600 ft <sup>2</sup> /yr
Vehicle Miles Traveled per Year =	62 miles/yr
Vehicle Speed =	5 mph
Avg. Fuel Use =	2 mpg

**Blasting**

Number of Blasts per Day =	8 blast/day
Number of Blasts per Year =	600 blast/yr
Blasting Area =	31 m <sup>2</sup>

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**Construction Emissions: Calculations**

**PM<sub>10</sub> Emissions**

Vehicle				Operating Schedule/Rate								Control Efficiency	Emission Factor	PM <sub>10</sub> Emission Rates	
Type	Avg Weight (tons)	Usage (%)	Speed (mph)	Hours (hr/yr)	Vehicle Miles (VMT/hr) (VMT/yr)		Blasting (per hr) (per yr)		Excavation/Loading (tons/hr) (tons/yr)		Maximum (lb/hr)			Annual (tons/yr)	
Unpaved Roads															
Light Truck	2	6%	10		8	1,875									
Bus	5	1%	10		3	375									
Dump Truck	13	32%	5		4	9,600									
Heavy Truck	13	0.1%	5		5	38									
Water Truck	10	60%	5		30	18,000									
Fleet Wt Avg	10	100%	5.4		49	29,888					0%	2.53	44.47    13.56		
Bulldozing and Compacting															
				600							0%		7.03    2.11		
Grading															
			5		15	62					0%	7.65	114.75    0.24		
Loading Excavated Material to Trucks and Truck Dumping															
									160	96,000	0%	0.001	0.13    0.04		
Scrapers															
					10	62					0%	20.20	202    0.62		
Blasting															
							8	600			0%	0.001	0.02    0.001		
Total Construction PM <sub>10</sub> Emissions													368.40    16.57		

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**United States Border Patrol  
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**Construction Emissions: Calculations**

**SO<sub>2</sub> Emissions**

Vehicle			Operating Schedule/Rate				Emission Factor Conversion			SO <sub>2</sub> Emission Rates		
Type	Fuel	Mileage (mpg)	Hours (hr/yr)	Vehicle Miles		Fuel Usage		AP-42 Table 3.3-1 (lb/MM Btu)	Heat Inp (Btu/gal)	EF (lb/M gal)	Maximum (lb/hr)	Annual (tons/yr)
				(VMT/hr)	(VMT/yr)	(gal/hr)	(gal/yr)					
Light Truck	Gasoline	21		8	1,875	0.4	89	0.084	144,130	12.11	0.004	0.001
Bus	Diesel	7		3	375	0.4	54	0.29	137,030	39.74	0.014	0.001
Dump Truck	Diesel	4		4	9,600	1.0	2,400	0.29	137,030	39.74	0.04	0.05
Heavy Truck	Diesel	5		5	38	1.0	8	0.29	137,030	39.74	0.04	0.000
Water Truck	Diesel	5		30	18,000	6.0	3,600	0.29	137,030	39.74	0.24	0.07
Bulldozer	Diesel					37.5	22,500	0.29	137,030	39.74	1.49	0.45
Scraper	Diesel	2		10	62	5.0	31	0.29	137,030	39.74	0.20	0.001
Total Construction SO <sub>2</sub> Emissions											2.03	0.57

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**United States Border Patrol**  
**Douglas Station Level Infrastructure EA**

**Construction Emissions: Equations and Data**

**Table 2. Constants, source conditions, and variables**

Variable	Description of Variable	Value	Reference
$k_1$	Empirical constant (lb/VMT)	2.6	AP-42 Table 13.2.2-2
$k_2$	Particle size multiplier	0.35	AP-42 13.2.4, Page 3
$s$	Surface material silt content (%)	35.0	AP-42 Table 13.2.2-3
$a$	Empirical constant	0.8	AP-42 Table 13.2.2-2
$W$	Mean vehicle weight (tons)		
$S$	Mean vehicle speed (mph)		
$b$	Empirical constant	0.4	AP-42 Table 13.2.2-2
$U$	Mean wind speed (mph)	8	NCDC 11/98
$A$	Blasting Surface Area (m <sup>2</sup> )		
$M_1$	Surface material moisture content (%)	20	AP-42 13.2.2, Related Information
$M_2$	Surface material moisture content (%)	2	EPA-451/R-93-004, Page 13
$c$	Empirical constant	0.3	AP-42 Table 13.2.2-2
$E_{ext}$	Size-specific emission factor (lb/VMT)		AP-42 13.2.2 Eq. (2)
$E_{(lb/ton)}$	Emission factor (lb/ton)		AP-42 13.2.4 Eq. (1)

**1. Unpaved Roads<sup>1</sup>**

$$E_{ext} = \left( \frac{k_1 (s/12)^a (W/3)^b}{(M/0.2)^c} \right) \quad [\text{Equation (2), AP-42 13.2.2}]$$

**2. Bulldozing and Compacting<sup>2</sup>**

$$E_{lb/hr} = \left[ \frac{1.0s^{1.5}}{M^{1.4}} \right] 0.75 \quad [\text{AP-42 Table 11.9-1}]$$

**3. Grading<sup>2</sup>**

$$E_{lb/VMT} = 0.51(S)^{2.0} (0.60) \quad [\text{AP-42 Table 11.9-1}]$$

**4. Loading Excavated Material to Trucks and Truck Dumping<sup>3</sup>**

$$E_{(lb/ton)} = 0.0032k_2 \frac{(U/5)^{1.3}}{(M_2/2)^{1.4}} \quad [\text{Equation (1), AP-42 13.2.4}]$$

**5. Scrapers<sup>4</sup>**

$$EF = 20.2 \text{ lb/VMT} \quad [\text{AP-42 Table 13.2.3-1}]$$

**6. Blasting<sup>2</sup>**

$$E_{kg/blast} = (0.52)(0.000014)A^{1.5} \quad [\text{AP-42 Table 11.9-1}]$$

1) Emission factors based on AP-42 Section 13.2.2 (9/98). Vehicle speeds less than 15 mph are corrected with the multiplier S/15. Moisture content is based on the related information document included in Section 13.2.2 Rdmoist.pdf, page 2.

2) Emission factors based on AP-42 Sections 13.2.3 (1/95) and/or 11.9 (7/98)

3) Emission factors based on AP-42 Sections 13.2.3 (1/95) and/or 13.2.4 (1/95)

4) Emission factors based on AP-42 Sections 13.2.3 (1/95)

**United States Border Patrol**  
**Douglas Station Level Infrastructure EA**

**Construcion Emissions: Calculation Assumptions**

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General Assumptions

Rotation =	10 days =	8 hr/day
Working Days per Year =	75 days/yr =	600 hr/yr
Miles Completed per Rotation =	1 mile	
Miles Completed per Year =	7.5 miles	
Project =	26 miles	
Quantity of Soil Moved =	533,675 cubic yards (cy)	
Density of Soil =	1890 lb/cy	
Mass of Soil Moved =	504,323 tons/project	
Mass of Soil Moved per Year =	145,478 tons/yr	
Water Spray =	2 applications/hr	

Light Trucks

Number of Trucks =	3 trucks
Number of Round Trips per Day =	5 round trips/day
Maximum Trips per Hour =	1.5 round trips/hr
Number of Miles per Round Trip =	5 miles/round trip
Vehicle Mass =	2 ton
Avg. Fuel Use =	21 mpg

Bus

Number of Busses =	1 bus
Number of Round Trips per Day =	1 round trips/day
Maximum Trips per Hour =	0.5 round trips/hr
Number of Miles per Round Trip =	5 miles/round trip
Vehicle Mass =	5 ton
Avg. Fuel Use =	7 mpg

Dump Trucks

Number of Trucks =	4 dump trucks
Truck Payload Capacity =	20 tons
Number of Round Trips per Year =	19,200 round trips/yr
Maximum Trips per Hour =	8 round trips/hr
Number of Miles per Round Trip =	0.5 miles/round trip
Vehicle Mass (no load) =	5 tons
Avg. Fuel Use =	4 mpg

Heavy Trucks

Number of Trucks =	2 heavy trucks
Number of Round Trips per Day =	0.1 round trips/day
Maximum Trips per Hour =	1 round trips/hr
Number of Miles per Round Trip =	5 miles/round trip
Truck Payload Capacity =	20 tons
Vehicle Mass =	5 tons
Avg. Fuel Use =	5 mpg

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**United States Border Patrol**  
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**Construcion Emissions: Calculation Assumptions**

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Water Trucks

Number of Trucks =	3 heavy trucks
Number of Round Trips per Day =	48 round trips/day
Maximum Trips per Hour =	6 round trips/hr
Number of Miles per Round Trip =	5 miles/round trip
Truck Payload Capacity =	15.65 tons
Vehicle Mass =	5 tons
Avg. Fuel Use =	5 mpg

Bulldozers

Number of Bulldozers =	3 bulldozers
Hours of Operation =	600 hr/yr
Avg. Fuel Use =	37.5 gal/hr

Grading

Number of Bulldozers =	3 bulldozers
Shovel Width =	8 ft
Width of Typical Graded Section =	66 ft
Area per Year =	2,613,600 ft <sup>2</sup> /yr
Vehicle Miles Traveled per Year =	62 miles/yr
Vehicle Speed =	5 mph

Truck Loading and Dumping

Number of Trucks =	4 dump trucks
Truck Capacity =	20 tons
Mass of Soil Moved per Year =	96,000 tons/yr
Mass of Soil Moved per Hour =	160 tons/hr

Scrapers

Number of Scrapers =	2 scrapers
Cut Width =	8 ft
Width of Typical Scraped Section =	66 ft
Area per Year =	2,613,600 ft <sup>2</sup> /yr
Vehicle Miles Traveled per Year =	62 miles/yr
Vehicle Speed =	5 mph
Avg. Fuel Use =	2 mpg

Blasting

Number of Blasts per Day =	8 blast/day
Number of Blasts per Year =	600 blast/yr
Blasting Area =	31 m <sup>2</sup>

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United States Border Patrol  
Douglas Station Level Infrastructure EA

**Construction Emissions: Calculations**

Vehicle				Operating Schedule/Rate						Control	Emission	PM <sub>10</sub> Emission Rates		
Type	Avg Weight (tons)	Usage (%)	Speed (mph)	Hours (hr/yr)	Vehicle Miles (VMT/hr) (VMT/yr)		Blasting (per hr) (per yr)		Excavation/Loading (tons/hr) (tons/yr)		Efficiency (%)	Factor (EF)	Maximum (lb/hr)	Annual (tons/yr)
Unpaved Roads														
Light Truck	2	6%	10		8	1,875								
Bus	2	1%	10		3	375								
Dump Truck	13	32%	5		4	9,600								
Heavy Truck	13	0.1%	5		5	38								
Water Truck	10	60%	5		30	18,000								
Fleet Wt Avg	10	100%	5.4		49	29,888					0%	2.53	44.40	13.54
Bulldozing and Compacting														
				600							0%		7.03	2.11
Grading														
			5		15	62					0%	7.65	114.75	0.24
Loading Excavated Material to Trucks and Truck Dumping														
								160	96,000		0%	0.001	0.13	0.04
Scrapers														
					10	62					0%	20.20	202	0.62
Blasting														
							8	600			0%	0.001	0.02	0.001
Total Construction Emissions													368.33	16.55

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**United States Border Patrol  
Douglas Station Level Infrastructure EA**

**Construction Emissions: Calculations**

**SO<sub>2</sub> Emissions**

Vehicle			Operating Schedule/Rate					Emission Factor Conversion			SO <sub>2</sub> Emission Rates	
Type	Fuel	Mileage (mpg)	Hours (hr/yr)	Vehicle Miles		Fuel Usage		AP-42 Table 3.3-1 (lb/MM Btu)	Heat Inp (Btu/gal)	EF (lb/M gal)	Maximum (lb/hr)	Annual (tons/yr)
				(VMT/hr)	(VMT/yr)	(gal/hr)	(gal/yr)					
Light Truck	Gasoline	21		8	1,875	0.4	89	0.084	144,130	12.11	0.004	0.001
Bus	Diesel	7		3	375	0.4	54	0.29	137,030	39.74	0.014	0.001
Dump Truck	Diesel	4		4	9,600	1.0	2,400	0.29	137,030	39.74	0.04	0.05
Heavy Truck	Diesel	5		5	38	1.0	8	0.29	137,030	39.74	0.04	0.000
Water Truck	Diesel	5		30	18,000	6.0	3,600	0.29	137,030	39.74	0.24	0.07
Bulldozer	Diesel					37.5	22500	0.29	137,030	39.74	1.49	0.45
Scraper	Diesel	2		10	62	5.0	31	0.29	137,030	39.74	0.20	0.001
Total Construction SO <sub>2</sub> Emissions											2.03	0.57

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